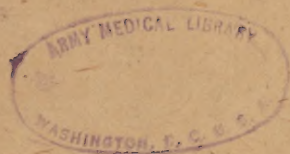


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THE GERMAN SURGICAL INSTRUMENT INDUSTRY IN THE TUTTLINGEN AREA



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COMBINED INTELLIGENCE OBJECTIVES
SUB-COMMITTEE

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THE GERMAN SURGICAL INSTRUMENT
INDUSTRY IN THE TUTTLINGEN AREA.

Reported by

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CIOS ITEM 24

Medical

Allied Forces. Supreme Headquarters.

COMBINED INTELLIGENCE OBJECTIVES SUB-COMMITTEE

G-2 Division SHAEF (Rear) APO 413.

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INTRODUCTION.

For more than one hundred and fifty years, the majority of the world's surgical instruments were manufactured in and around the village of Tuttlingen on the outskirts of Germany's Black Forest. With generations of skilled instrument makers behind them, Tuttlingen craftsmen learned and developed the precise techniques required in the making of fine surgical instruments.

During the past seventy-five years, many of these instrument makers migrated to the United States, where they set up their own shops, continued in the practice of their trade, and aided materially in the building of what was, prior to the war, the only serious contender for Germany's position in the field.

Not having enough skilled mechanics in the trade, however, American industry has been forced to limit itself to the manufacture of a comparatively small variety of patterns which could be produced in quantities sufficient to meet the expanding requirements of the Army and Navy. As a result, American manufacturers, while not as versatile as their German counterparts, now produce instruments of excellent quality and have developed new machines, and new uses for old machines to replace some of the skilled men who were lacking.

In the final analysis, however, no machine or combination of machines can replace the vast amount of skill and practice which goes into the making of delicate, perfectly made instruments.

This may be better understood by a general knowledge of the steps involved in the manufacture of an instrument.

1. SELECTION OF THE PROPER PATTERN. This, in many ways, is the most important step because even though all the subsequent steps and workmanship may be correctly performed, a poorly designed instrument would be of little or no use for the purpose for which it is intended.

2. SELECTION OF THE APPROPRIATE TYPE OF MATERIAL. Cutting instruments demand hardness without brittleness and the ability to retain a keen cutting edge; clamps and forceps must have resiliency and toughness. The desirability of using stainless steel, carbon steel, or non-ferrous metals must be considered.

3. FORGING. The steel is heated to a specified temperature and struck into a die, either by hand or in a drop-forge.

4. TRIMMING. Excess metal is removed by means of a punching die. This may involve one or more different dies and therefore an equal number of punching operations.

5. CLEANING. Scale, or oxidized metal must be removed, either by sand blasting, tumbling, or by acid.

6. ROUGH GRINDING. This is the initial hand operation. The instrument is held by hand, against a stone grinding wheel, and just the 'right' amount of metal must be ground off; too little may make the instrument heavy and clumsy, too much will leave it flimsy and subject to early failure.

7. a. MILLING. Serrations, ratchets, and joints (in the case of forceps) are milled by machine to extremely close tolerances.

b. GRINDING. Cutting edges receive their first grinding a hand operation.

8. ASSEMBLY. Box-lock forceps are assembled by hand, drilled, riveted and adjusted. Scissors are often assembled after heat treatment or tempering.

9. GRINDING. The assembled instrument is ground again, this time with a slightly finer grade of wheel.

10. HEAT TREATING (tempering). Usually performed by means of electric furnaces, this operation is extremely important and must be closely controlled. Thermocouples are used to give accurate temperature readings, as too low a temperature will leave an instrument soft, while too high a temperature makes it brittle. Following the hardening, an instrument must be "drawn", or subjected to a lower temperature for a specified length of time in order to relieve the stresses and strains set up within it by the hardening operation.

11. FINAL GRINDING. At this point an instrument begins to have a definite "feel" or balance - it may be stiff or weak, light or heavy.

12. POLISHING. Using high speed cloth polishing wheels and compounds made specially for the purpose, experienced polishers may proceed with three or more polishing operations, each one of which is critical as the operator must know exactly at what point enough metal has been removed.

13. CLEANING. Each instrument is degreased.

14. a. PLATING. If the instrument is not made of corrosion resisting steel, successive electro-plating of nickel and chromium is desirable, although for many years prior to 1929 nickel alone was used.

b. PASSIVATING. If corrosion resisting steel is used, the instrument is immersed in an acid bath which imparts additional rust resistant qualities.

15. FINAL BUFFING. The final high lustre is gained through the use of soft, dry cloth buffing wheels. Care must be exercised in the buffing of plated instruments so that too much plating is not removed.

16. FINAL INSPECTION AND ADJUSTMENT. Although inspection is usually performed at various points throughout the processes outlined above, final inspection is a "must" because it is here that adjustment by an experienced hand must be made. A small amount of acid-free anhydrous lubricating oil is applied, and the finished instrument is packaged.

These steps may vary slightly in sequence and form between different manufacturers, but in general they represent standard practice in the industry. When non-ferrous metals are used they are stamped, cast, or hand-worked and are never heat treated as described above. The more delicate an instrument is, the more hand work replaces machine operations (fine teeth are hand-filed instead of milled, fine cutting edges are hand-honed instead of ground, etc).

It is hoped that the above summary will provide an understanding of the steps involved in the making of an instrument, and also make clear the reason why no particularly unusual innovations were observed during the survey covered by this report.

1. Plant visited: C. Bruno Bayha, Tuttlingen, Germany.
Date of visit: 14 - 15 June 1945.
Persons interviewed: Mr. Carl Bayha, Mr. Bruno Bayha.
Items manufactured during the war: Plaster shears, traction bows, general purpose scissors, surgical knives.

General Information: Prior to the war, this plant manufactured a large variety of high quality surgical instruments, which were exported to other parts of Europe and to North and South America. The limited variety manufactured during the war was due, it was stated, to the fact that neither of the partners in the

firm were members of the Nazi party and were therefore not granted enough orders to utilize their full capacity. At the present time the plant is intact but not operating, due to the lack of coal. It was stated that the occupying troops have confiscated practically all servicable stocks of instruments.

Technical Information: Instruments manufactured during the war were made of nickel plated carbon steel of a quality approximately equal to pre-war standards. No chromium was available to the industry, which accounts for the absence of any stainless steel or chrome plated steel. Most machinery and production methods are believed to be antiquated although a jig was noted which is used to secure certain types of scissors during the rough grinding operation. This type of attachment is not entirely new, and its use is extremely limited. It was stated by Mr. Carl Bayha that, in general, machine grinding of scissors has not been successful. An interesting innovation was also noted in the plating department, namely, an electrolytic degreasing apparatus which, in addition to cleaning an instrument, deposits a very light coating, or 'flash' of copper on the instrument, thus forming an excellent base for the subsequent electroplate of nickel. This procedure is not, it is believed, generally followed by industry in the United States although it is known.

II. Plant visited: Jetter & Scheerer, Tuttlingen, Germany.

Date of visit: 15 June 1945.

Persons interviewed: Mr. Fritz Scheerer, Mr. Hans

Hans Scheerer.

Items manufactured during the war: (See attached list) (plus-) a large variety of individual instruments.

General Information: This plant, formerly employing about 1800 people, was the largest single surgical instrument factory in the world. A huge variety of extremely high quality stocks were shipped from here to all parts of the world, and the name is one of the best-known in the trade. The factories suffered little as a result of enemy action, and were it not for the lack of coal and window glass, could resume production in a relatively short time. Occupying troops have confiscated practically all finished stocks, some semi-finished stocks, and many precision tools, it was said. Prior to and during the war, the firm aided in and at times contracted for the development of sets of instruments to be used by the Army and Navy. Every effort was made to utilize standard patterns which provided for the utmost economy in manufacturing costs. Forceps, for example, were all of the screw-lock or "aesculap" - lock variety - patterns which have for the past ten years been considered inferior to the box-lock type

currently used by the U.S. Army Medical Department. It was estimated by Mr. Fritz Schoerer that during the last year of the war, this firm supplied about sixty percent of the German Army's requirements for all the basic instrument sets as well as quantities of individual pieces. Quantities of castings, forgings, and stampings were also produced for the automotive and aircraft industries.

Technical Information: This investigator was taken through the factories which, in general, seemed intact. Machinery and equipment were in good condition, and dies had not been disturbed by the occupying troops, although, as stated above, some precision tools had been removed. Aluminium was used in place of brass in the manufacture of various racks, trays, and containers, for brass which was formerly used for this purpose, was not available during the war, and also because of the additional reduction in weight provided by aluminium. No new methods or innovations in the manufacture of instruments were noted, although it is difficult to confirm the fact as the factory was at a complete standstill and therefore certain operations could only be visualized.

III. Plant visited: Chiron Works, Tuttlingen, Germany.

Date of visit: 15 June 1945.

Persons interviewed: Mr. Staebler, Mr. von Sochaczewski.

Items manufactured during the war: Principal instrument sets, large variety of individual instruments.

General Information: Occupying the newest instrument factory in Germany, this firm has long been one of the largest producers although the quality of the products has not always been as good as those of such firms as Jetter, Schoerer, Martin or Bayha. It is believed that Chiron has utilized machines to a greater extent than other comparable factories, and that the management has been more aware of modern trends in working conditions. For example, tiled showers, attractive dining facilities and daily musical programs are provided for employees, as well as pleasant appearing, orderly shops such as have not been seen in other factories in this region. War production was concerned largely with the manufacture of the various basic instrument sets as well as quantities of individual items.

Technical Information: Such new procedures as the machine-cutting of dies, machine-tracing of grinding wheels, and electro-polishing, while not new to American industry, were not observed in other German instrument plants. As in the factories of nearby instrument manufacturers, no chromium was used during the war, and aluminium was used in many cases to replace brass. Approximately thirty percent of the Wehrmacht's needs for basic instrument sets were supplied by Chiron.

IV. Plants visited: Albert Heise, Georg Haenke,
Tuttlingen, Germany.

Date of visit: 15 June 1945.

Items manufactured during the war: Syringes,
eye and ear instruments.

Both of these plants are extremely small, and manufacture largely for prime contractors. Both methods and products are of ordinary nature, and no unusual features were noted.

V. Plant visited: Gebrüder Martin.

Date of visit: 15 June 1945.

Offices and showroom were completely destroyed. No one was available for questioning.

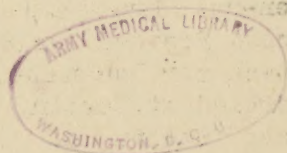
VI. The following information concerning the purchasing and development of instruments and instrument sets represents a composite of details given by all the plants visited.

In 1939, a Sanitatsoffizier Doctor Gropler was in charge of the procurement of surgical instruments for the Wehrmacht. Through the firm of Medici, in Berlin, a retail chain store type of surgical supply house, initial purchases and development of Army instrument sets were begun. Soon it was found that the actual manufacturers were far more useful in the field because of their long experience, and they were therefore consulted. In an effort to establish a series of cheap and efficient patterns for the Army, an instrument maker named Hilzinger from Tuttlingen was summoned to the Berlin Hauptsanitätspark as consultant in the development of these sets. At about this time, Dr. Gropler became involved in some difficulty, was discharged from the Army, was placed in a concentration camp, and has not been heard of since. Thereafter, all procurement of instruments which are standard with the Army was done through the Berlin Hauptsanitätspark. At times contracts were let for the development of specific sets, and the manufacturers played the leading role in designing and constructing the first samples. Upon acceptance by the Army, manufacturers were forced to work together to produce the sets in the shortest possible time. With the exception of the "Fachärztliches Besteck zur Behandlung von Hals-Nasen-und Ohrenkranken, Neurochirurgisches Zusatzbesteck, Fachärztliches Besteck zur Behandlung von Augenkranken, Fachärztliches Besteck zur Behandlung von Geschlechtskranken", which were assembled at Berlin, sets were assembled at the factories in and around Tuttlingen.

VII. JETTER & SCHEERER LIST.

Hauptbesteck
Sammelbesteck
Truppenbesteck
Sezierbesteck
Mikroskopisches Besteck
Taschenbesteck für Sanitäts Offiziere
Sanitäts-Verbandtasche
Zahnärztliches Gerät, Modell 1941
Amagnetisches Besteck zum Splittersuchgerät
Fachärztliches Besteck f. Hals, Nasen-u. Chrenkranke
Fachärztliches Besteck zur Behandlung von Augenkrankheiten
Neurochirurgisches Besteck
Fachärztliches Besteck zur Behandlung von Haut-und Geschlechts-
krankheiten
Geburtshilfliches Besteck (Reichswehrmodell)
Gynkologisches und Abortusbesteck (Reichswehrmodell)
Gefässnahtbesteck
Besteck zur Schenkelhalsnagelung
Marine - Instrumentenbesteck No. I zur Amputation u. Resektion
Marine - Instrumentenbesteck No. II zu verschiedenen Operationen
Marine - Instrumentenbesteck No. III zu Augen-, Ohren-und Nasen-
Operationen
Marine - Instrumentenbesteck No. IV zur Tracheotomie
Marine - Instrumentenbesteck No. V
Marine - Instrumentenbesteck No. VI zur Wundnaht usw.
Marine - Instrumentenbesteck No. VII zur Obduktion
Marine - Instrumentenbesteck No. VIII zur Zahnbehandlung
Marine - Instrumentenbesteck No. IX zur Geburtshilfe Dto. Bordmodell
Marine - Instrumentenbesteck No. X zur Gynäkologie Bormodell
Landungskoffer

VIII This report is essentially a preliminary one. More detailed information will be presented in later reports by TIIC investigators.



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